

- Angelin's opinion allied to *C. scrobiculatus*, and I believe that the latter also should be removed from *Tycnosaccus*; only the evidence of Angelin's pl. xv. fig. 11 could lead one to retain it in that genus, and this figure has a most artificial appearance. Until, therefore, an examination of the type specimens is possible, I shall, for convenience' sake, continue to speak of *Oncocrinus*.
- Ottawacrinus*—(4?); beyond the 6 quadrangular costals nothing is yet known.
- Parisocrinus radiatus*—8; after de Koninck and Le Hon, Recherches sur les Crin. carb. Belgique, pl. i. fig. 12 b.
- Phialocrinus*—15.
- Phalocrinus*—16.
- Poteriocrinus*—12.
- Proclivocrinus*—as *Calceocrinus*, *q. v.*
- Scaphiocrinus Swallovi*—12; in this sp. the ossicles interlock towards tips of arms; after Whitfield, Amer. Mus. Nat. Hist. N. Y. Bull. i. December 1881, sub *Poteriocr. Jesupi*. For clearness' sake the pinnules are only shown along one set of branches.
- Seytalecrinus*—15.
- Sicyocrinus*—9.
- Sphaerocrinus*—3.
- Stenmatocrinus*—18. See Trautschold, "Mon. Kalkbr. Mjatschkowa," Mém. Soc. Imp. Nat. Moscou, xiv. pl. xiv. fig. 12 (1879).
- Streptocrinus*—3, but not much known of arms.
- Synphocrinus*—vide sub *Bursacrinus*.
- Tribrachiocrinus*—arms unknown except so far as shown in Pl. XIV. fig. 35.
- Vasocrinus*—10; 3 costals; arms and armlets less robust.
- Woodocrinus macrodactylus*—16; after de Koninck, Mém. Acad. Roy. Belgique, xxviii. pl. viii. fig. 1 c (1854). For clearness' sake the pinnules are only shown along one branch.
- Zeacrinus*—16; dichotomize towards inner side of ray; ossicles short, their width diminishes by $\frac{1}{2}$ in successive orders; arms meet laterally, cf. *Bursacrinus*.

XLIX.—*On some new and imperfectly-defined Species of Jurassic, Cretaceous, and Tertiary Nautili contained in the British Museum (Natural History).* By ARTHUR H. FOORD, F.G.S., and G. C. CRICK, Assoc. R.S.M., F.G.S., Assistant in the Geological Department, British Museum.

IN the last number of this Magazine we described and re-defined some species of Jurassic Nautili in the British Museum. In this article we complete for the present our work upon the Jurassic and take up the Cretaceous and Tertiary species. Since the former paper was published some Jurassic forms have been added, enabling us to describe a new species from the Lower Oolite.

Appended is a list (pp. 390 and 391) of all the Cretaceous and Tertiary Nautili now in the Museum, together with the new Jurassic species. The species are arranged in two

columns; the first contains the new species and also those requiring emendation, the second includes only well-recognized species; to each of the latter, however, the reference to the original description is attached.

It will be observed that some of the species described below are placed in the subgenus *Hercoglossa*, Conrad*. The following is Meek's† emended description of this subgenus:—"Shell more or less discoid, with umbilicus closed or small, and periphery usually rather narrowly rounded‡; volutions deeply embracing, surface nearly smooth, or with lines of growth; septa deflected backwards in crossing each side, so as to form a deep, usually angular, lateral lobe." Type *Nautilus orbiculatus*, Tuomey §. Trias to Eocene.

Nautilus Parkinsoni, Edwards ||, is cited by Meek as belonging also to *Hercoglossa*. Of this species only two examples are known to us, both from the London Clay—the one figured by Parkinson ¶ and also by Edwards, now in the "Sowerby Collection," British Museum, the other from Colchester. Both specimens are remarkably large; Parkinson's consists merely of the casts of three chambers, to which a portion of the inner whorls, badly preserved, is attached; the largest chamber is 8 inches in height and 6 inches in width. Owing to the form of the sutures some doubt originally existed as to whether this specimen should not be placed in *Aturia*. Although the siphuncle is cylindrical, as in *Nautilus*, the sutures suggested its being the adult of *Aturia*. Unfortunately the inner whorls are so much crushed that the form of the siphuncle in the young shell cannot be ascertained. The specimen from Colchester, which measures 11 inches in diameter, shows, however, that the siphuncle is cylindrical not only in the adult, but even where the diameter of the shell does not exceed 2½ inches. We feel justified therefore in concluding with Meek that *Nautilus Parkinsoni* belongs to the

* Amer. Journ. of Conchology, 1866, vol. ii. no. 2, p. 101.

† United States Geol. Surv. Terr. 1876, vol. ix. p. 491.

‡ Sometimes flattened, as in *Nautilus (Hercoglossa) franconicus*, Oppel, or even sulcated, as in *N. (H.) Picteti*, Oppel. For other species of *Hercoglossa* see "Die Cephalopoden der Stramberger Schichten," in Oppel and Zittel's 'Palaeontologische Mittheilungen,' 1868, Band i. Abth. ii. Atlas, pls. ii., iii., iv. On referring to the 'Catalogue of Scientific Works' published by E. Koch, Stuttgart (1880-1886), we find that this part of the Palaeont. Mitth. is erroneously marked both on the cover and titlepage "Zweiter Band, Erste Abtheilung," whereas it should be "Erster Band, Zweite Abtheilung."

§ Proceed Acad. Nat. Sci. Philadelphia, 1854, p. 167.

|| Mon. Eocene Mollusca (Pal. Soc.), 1849, pt. i. p. 49, pl. vii.

¶ 'Organic Remains,' 1811, vol. iii. pl. vii. fig. 15.

JURASSIC.

1. *Nautilus lineolatus*, sp. nov.
2. — (*Herzoglossa*) *aganiticus*, Schlothheim.
3. — (—) *francoenicus*, Oppel.
4. — (—) *portlandicus*, sp. nov.
5. — *radiatus*, J. Sowerby.
6. — *neoconiacensis*, d'Orbigny.
7. — *hunstamtonensis*, sp. nov.
8. — *triangularis*, Montfort.
9. — *libanoticus*, sp. nov.
10. — *Bayfieldi*, sp. nov.
11. — (*Herzoglossa*) *danicus*, Schlothheim.

CRETACEOUS.

- Nautilus undulatus*, J. Sowerby, Min. Conch. vol. ii. p. 87 (1813), pl. xl.
- *plicatus*, Fitton, Trans. Geol. Soc. vol. iv. pt. ii. p. 129 (woodcut) (1835).
- *farringtonensis*, Sharpe, Quart. Journ. Geol. Soc. vol. x. p. 181 (1854), pl. vi. figs. 1 a, 1 b.
- *Sacchi*, Morris, Ann. & Mag. Nat. Hist. ser. 2, vol. i. p. 106 (woodcut) (1848).
- *pseudocleagus*, d'Orbigny, Pal. Franç., Terr. Crét. tom. i. p. 70 (1847), pls. viii. & ix.
- *albensis*, d'Orbigny, Prodr. de Paléont. Stratigr. vol. ii. p. 122 (1850).
- *Clementius*, d'Orbigny, Pal. Franç., Terr. Crét. vol. i. p. 77 (1840), pl. xiii. bis.
- *Bouchardianus*, d'Orbigny, Pal. Franç., Terr. Crét. vol. i. p. 75 (1840), pl. xiii.
- *Montmolini*, Pictet & Campiche, Pal. Suisse, sér. ii. p. 147 (1859), pl. xviii. figs. 4-6.
- *Fittoni*, Sharpe, Foss. Mollusca Chalk, Mon. Pal. Soc. p. 17 (1853), pl. vi. fig. 4.
- *Largillertianus*, d'Orbigny, Pal. Franç., Terr. Crét. vol. i. p. 86 (1840), pl. xviii.
- *Sowerbyanus*, d'Orbigny, Pal. Franç., Terr. Crét. vol. i. p. 83 (1840), pl. xvi.
- *Fleurianus*, d'Orbigny, Pal. Franç., Terr. Crét. vol. i. p. 82 (1840), pl. xv.
- *expansus*, J. de C. Sowerby, Min. Conch. vol. v. p. 83 (1824), pl. ccccviii. fig. 1.
- *Deslogchampianus*, d'Orbigny, Pal. Franç., Terr. Crét. vol. i. p. 90 (1840), pl. xx.
- *elegans*, J. Sowerby, Min. Conch. vol. ii. p. 33 (1816), pl. cxvi.
- *sublevigatus*, d'Orbigny, Prodr. de Paléont. Stratigr. vol. ii. p. 189 (1850).
- *quadrilunatus*, Favre, Descr. des Moll. Foss. de la Craie des environs de Lemberg en Galicie, p. 10 (1869), pl. iii. figs. 4 a, b.
- *Reussi*, Fritsch, Cephalopoden der böhm. Kreideformation, p. 25 (1872), Taf. xii. figs. 4, 5.
- *Dekeyi*, Morton, Synopsis of the Organic Remains of the Cretaceous Group of the United States, p. 33 (1834), pl. viii. fig. 4.
- *d'Orbignyanus*, Forbes, in Darwin's Geological Observations, pt. iii., Appendix, p. 265 (1846), pl. v. figs. 1 a, 1 b.
- *Huxleyanus*, Blanford, Mem. Geol. Surv. India, Pal. Indica, p. 19 (1861), pl. vii. figs. 3, 4, pl. viii. figs. 1-3, pl. ix. figs. 1-4.

— *sphaereus*, Forbes, Trans. Geol. Soc. ser. ii. vol. vii. p. 98, woodcut (1846).
 — (*Herceoglossa trichanopolitensis*, Blanford, Mem. Geol. Surv. India, Pal. Indica, p. 37 (1861), pl. xxiii., pl. xxiv. figs. 1, 2.

TERTIARY.

12. *Nautilus (Herceoglossa) Cassinianus*, sp. nov.

- *centralis*, J. Sowerby, Min. Conch. vol. i. p. 11 (1812), pl. i. (left-hand figure).
 — *imperialis*, J. Sowerby, Min. Conch. vol. i. p. 9 (1812), pl. i. (upper and right-hand figures).
 — *regalis*, J. de C. Sowerby, Min. Conch. vol. iv. p. 77 (1822), pl. ccciv.
 — *Sowerbyi*, Wetherell, Phil. Mag. and Journ. vol. ix. p. 466 (1836), pl. vi.
 — *urbanus*, J. de C. Sowerby, Min. Conch. vol. vii. p. 36 (1843), pl. dxxxviii.
 — *macrocephalus**, Schafhäütl, Süd-Bayerns Leth. Geogn. p. 214 (1863), pls. lvii., lviii.
 — *ellipticus**, Schafhäütl, Süd-Bayerns Leth. Geogn.
 — *Labechi*, d'Archiac, Descr. des Anim. Foss. du groupe Nummulitique de l'Inde, livr. ii. p. 338 (1854), pl. xxxiv. figs. 13, 13 a, 13 b.
 — *Forbesi*, d'Archiac, Descr. des Anim. Foss. du groupe Nummulitique de l'Inde, livr. ii. p. 338 (1854), pl. xxxiv. figs. 12, 12 a.
 — *Delaci*, d'Archiac, Descr. des Anim. Foss. du groupe Nummulitique de l'Inde, livr. ii. p. 337 (1854), pl. xxxv. figs. 2, 2 a.
 — sp. †, Miocene?, near Geelong, Victoria (Australia).
 — sp. †, Kirind, Persia. See paper by W. K. Loftus, "On the Geology of Portions of the Turko-Persian Frontier," in Quart. Journ. Geol. Soc. vol. xi. p. 247 (1855).
 — sp. †, Miocene, Malta. See paper by Lieut. Spratt, R.N., "On the Geology of the Maltese Islands," in Quart. Journ. Geol. Soc. vol. iv. pt. ii. p. 231 (1843).
 — (*Herceoglossa Parkinsoni*, Edwards, Eocene Mollusca, Mon. Pal. Soc. p. 49 (1849), pl. vii.

* The specimens from Kressenberg (Bavaria) referred to these two species are casts in a coarsely granular matrix, in which only the bare outline of the shell is preserved, without any other specific characters. In such circumstances their identity with Schafhäütl's species must be considered doubtful, and we may add that many of that author's species are, owing to their condition of preservation, very unsatisfactory.

† These are too imperfect for specific identification.

subgenus *Hercoglossa*, and not to *Aturia*. It may here be added that Conrad distinctly states in his description of *Hercoglossa* * that the siphuncle is not funnel-shaped [as in *Aturia*], but tubular. He includes in *Hercoglossa* the *Aturia Mathewsoni* of Gabb †, though doubtfully, because Gabb did not describe the character or position of the siphuncle in his species, merely stating "siphuncle large."

It is open to question whether *Grypoceras*, Hyatt ‡, should not be merged in *Hercoglossa*; we are inclined to the opinion that it should. Thus the type species of the former (*Nautilus mesodiscus*, Hauer §) is distinguished, according to Hyatt, from that of the latter (*N. danicus*, Schloth.) by the presence of a "V-shaped" ventral lobe in the sutures and by a flattening of the periphery "at some stage of growth." Now in some species the ventral lobe, as, e. g., in the type, is perfectly distinct, but in others, as, for instance, *N. strambergensis*, Oppel ||, it is so slightly indicated as to approach those species, such as *N. Oppeli*, Zittel ¶, in which there is no such lobe. In other species, again, the presence of the lobe is due, in part at least, to the sulcation of the periphery.

The flattening of the periphery mentioned by Hyatt as also one of the characters of *Grypoceras* is not always accompanied by "V-shaped ventral lobes," *Nautilus Picteti*, Oppel, having a flattened and sulcated periphery, but no ventral lobe. The distinction therefore between *Grypoceras* and *Hercoglossa* is very difficult to maintain.

We include also in *Hercoglossa* the genus *Enclimatoceras* of Hyatt **, type *E. Ulrichi*, White ††.

Professor Dr. K. A. von Zittel ‡‡ retains the name *Aganides*, Montfort, for *Nautilus franconicus*, Oppel, &c.; but if the type specimen of Montfort's genus came from Namur, as stated by Montfort and afterwards by Sonnini §§, there is a strong probability that it was a Goniaticite, the rocks in that

* Amer. Journ. of Conchology, 1866, vol. ii. no. 2, p. 101.

† Geol. Surv. of California, Palæont. 1864, vol. i. p. 59.

‡ Proceed. Boston Soc. Nat. Hist. 1883, vol. xxii. p. 269.

§ 'Die Cephalopoden des Salzkammergutes,' 1846, p. 36, tab. x. figs. 4-6. See also Mojsisovics, 'Das Gebirge um Hallstatt,' 1873, p. 21, Taf. viii. fig. 1.

|| 'Die Petrefactenkunde,' 1820, p. 83.

¶ 'Die Cephalopoden der Stramberger Schichten,' in Oppel and Zittel's 'Palæontologische Mittheilungen,' 1868, Band i. Abth. ii. p. 42, tab. ii. figs. 8-11.

** Proceed. Boston Soc. Nat. Hist. 1883, vol. xxii. p. 270.

†† Bull. United States Geol. Surv. 1884, vol. i. p. 17, pls. vii., viii., ix.

‡‡ Handbuch der Palæontology, Band ii. p. 383 (1884).

§§ Hist. Nat. des Mollusques (Montfort's ed. of Sonnini's 'Suite à Buffon'), tom. iv. 1799 (An x.), p. 253, pl. xlvi. fig. 1.

neighbourhood being of Carboniferous age. It is true that the siphuncle is represented in Sonnini's figure as nearly central, but this might have been a mistake on the part of the artist. It would at any rate be impossible to settle this question without a reference to the original specimen, and in the meanwhile it would not be advisable to adopt Montfort's name *Aganides* so long as there is any uncertainty about the type specimen*.

JURASSIC.

1. *Nautilus lineolatus*, sp. nov.

Sp. char. Shell thick, somewhat inflated on the sides, with a broad and flattened periphery; greatest breadth of the whorls at about the middle of the sides; aperture wider than high, presenting a distinctly subquadrate section. Umbilicus very small and deep, with rounded border. Septa moderately distant; sutures rather concave on the sides of the shell and forming a very slight sinus on the periphery. Siphuncle not seen. Test thick, ornamented with subregular lines of growth.

A large example from Vetney Cross, Dorsetshire, measures 6 inches in diameter and 4 inches in its greatest breadth.

Remarks. This species is closely allied to *Nautilus clausus*, d'Orbigny, but it is distinguished by its less rapid rate of increase, by its open umbilicus, and on the whole by its more compressed form. The body-chamber of a young example (no. 36952) exhibits traces of the anterior border of the impression of the shell-muscle.

We have not thought it necessary to figure this species, on account of its great similarity to *N. clausus*.

A small specimen from the Upper Lias of Fontaine-Étoupe-Four probably belongs to this species.

Horizon. Inferior Oolite (England); Upper Lias (France).

Locality. Yeovil, Somersetshire (no. 36952); Vetney Cross, Dorsetshire; Fontaine-Étoupe-Four (Calvados), France.

2. *Nautilus (Hercoglossa) aganiticus*, Schlotheim.

1820. *Nautilites aganiticus*, Schlotheim, Die Petrefactenkunde, p. 83.

1858. *Nautilus aganiticus*, Oppel, Die Juraformation Englands, Frankreichs und des südwestl. Deutschlands, p. 686.

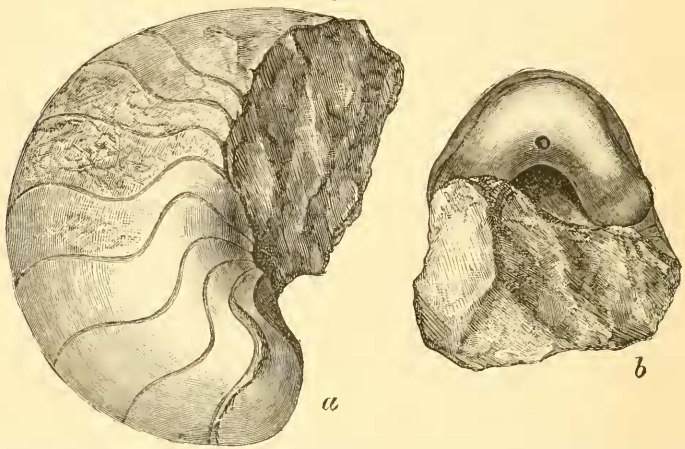
1868. *Nautilus aganiticus*, Zittel, "Die Cephalopoden der Stramberger Schichten," in Oppel and Zittel's 'Palæontologische Mittheilungen,' Band i. Abth. ii. p. 43.

Sp. char. Shell somewhat inflated, slightly compressed on the sides, rather narrowly rounded on the periphery. Umbili-

* See remarks on the name *Aganides* by Meek (too long for insertion here), United States Geol. Surv. Terr. vol. ix. 1876, p. 494.

cus very small or perhaps closed. Septa wide apart, being 9 lines distant from each other where the height of the whorl is 2 inches. Sutures strongly arched forward after leaving

Fig. 1.



Nautilus (Hercoglossa) aganiticus.—*a*, lateral view of an imperfect specimen, showing the deeply lobed sutures; *b*, view of the septum which faces the letter *a* in the other figure, showing the position of the siphuncle. Drawn from a specimen in the British Museum (no. C. 3173). A little more than one half natural size.

the umbilicus, then sweeping backward in a larger curve, and again forward towards the periphery, which they cross without forming any sinus. Siphuncle situated a little below the centre.

Remarks. This species was long confounded with another from a higher horizon (the Tithonian), afterwards designated by Oppel *franconicus* *. The present species is now restricted to a form found in the Eisenoolith of Villecomte, in Lothringen (Lorraine) †. *N. aganiticus* is easily distinguished from *N. franconicus* by its much more inflated form, rounded periphery, somewhat less flexuous sutures, and the position of its siphuncle. In its general form, especially in the rounding of the periphery, this species bears a much closer resemblance to *Nautilus (Hercoglossa) portlandicus*, which, however, differs in the form of its sutures. It has perhaps also some relationship with *N. Forbesi*, d'Archiac, and *N. Deluci*,

* Oppel, "Die Tithonische Etage," Zeitschr. der deutsch. geol. Gesell. Band xvii. 1865, p. 546.

† Zittel, "Die Cephalopoden der Stramberger Schichten," in Oppel and Zittel's 'Palaeontologische Mittheilungen,' Band i. Abth. ii. 1868, p. 43.

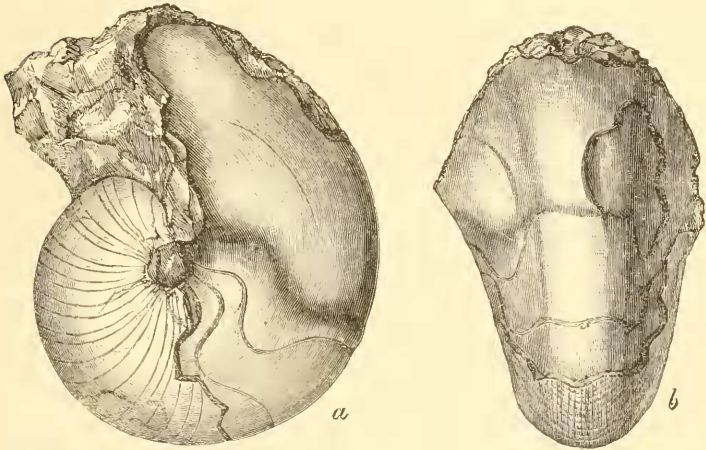
d'Arch.^{*}, from the Eocene of Sindh (India), with both of which it agrees in the form of its sutures and the situation of its siphuncle; it is, however, a more inflated shell and has a rounder periphery than either of the Indian species.

Horizon. Inferior Oolite (Middle Brown Jura).

Locality. Villecomte, Lothringen.

3. *Nautilus (Hercoglossa) franconicus*, Oppel.

Fig. 2.



Nautilus (Hercoglossa) franconicus.—*a*, lateral view, showing two of the septa and a peculiar ridge at the base of the body-chamber; the curved line upon the cast of the latter is the anterior boundary of the impression of the shell-muscle; the test which covers the greater portion of the septate part of the shell is covered with fine lines of growth; they are a little too distinct in the engraving. *b*, peripheral view, showing the flattening of the sides and periphery. Drawn from a specimen in the British Museum (no. C. 3109). Nearly two thirds natural size.

1832. *Nautilus aganiticus*?, Bronn, in Leonhard and Bronn's *Jahrbuch für Mineralogie, &c.*, p. 70.

1837. *Nautilus aganiticus*, von Buch, *Ueber den Jura in Deutschland*, Akad. der Wissensch. p. 119.

1849. *Nautilus aganiticus*, Quenstedt, *Die Cephalopoden*, p. 58, tab. ii. fig. 6 (not of Schlotheim).

1865. *Nautilus franconicus*, Oppel, *Die Tithonische Etage*, *Zeitschr. der deutsch. geol. Gesell.* Band xvii. p. 546.

? 1865. *Nautilus strambergensis*, Oppel, *ibid.*

? 1868. *Nautilus strambergensis*, Zittel, "Die Cephalopoden der Stramberger Schichten," in Oppel and Zittel's '*Palaeontologische Mittheilungen*,' Band i. Abth. ii. p. 42, Atlas, tab. ii. figs. 8-11.

* 'Description des Animaux Fossiles du Groupe Nummulitique de l'Inde,' 1854, livr. ii. p. 337, (*N. Deluci*) pl. xxxv. figs. 2, 2*a*: (*N. Forbesi*) pl. xxxiv. figs. 12, 12*a*.

1870. *Nautilus aganiticus*, F. Roemer, Geologie von Oberschlesien, p. 252, Taf. xxiv. fig. 6.
1871. *Nautilus* cf. *strambergensis*, Herbich, Verh. u. Mitth. des naturwiss. Vereines zu Herrmanstadt.
1873. *Nautilus franconicus*, Neumayr, Die Fauna der Schichten mit *Aspidoceras acanthicum*, Abhandl. der k.-k. geol. Reichsanst. Band v. Heft 6, p. 156.
1875. *Nautilus franconicus*, von Ammon, Die Jura-Ablagerungen zwischen Regensburg und Passau, p. 163, tab. i. fig. 1.
1875. *Nautilus franconicus*, Favre, Descr. des Foss. du Terr. Jurass. de la Montagne des Voirons (Savoie), Mém. Soc. Pal. Suisse, vol. ii. p. 16, pl. i. figs. 6 a, 6 b.
1876. *Nautilus franconicus*, de Loriol, Mon. Pal. des Couches de la zone à *Ammonites tenuilobatus*, Mém. Soc. Pal. Suisse, vol. iii. pt. i. p. 13.
- ? 1877. *Nautilus aganiticus*, Blake and Huddleston, On the Coralline Rocks of England, Quart. Journ. Geol. Soc. vol. xxxiii. p. 400.
- ? 1878. *Nautilus aganiticus*, Huddleston, The Yorkshire Oolites, Proc. Geol. Assoc. vol. v. no 8, p. 482.
1878. *Nautilus franconicus*, Herbich, Das Széklerland mit Berücksichtigung der angrenzenden Landestheile, Mittheil. aus dem Jahrb. der kön. ungar. geol. Anstalt, Band v. Heft 2, p. 139, Taf. i. fig. 3.
1881. *Nautilus franconicus*, Schlosser, Die Fauna des Kelheimer Diceraskalkes, Abth. i. p. 61, Palæontographica, Band xxviii.

Sp. char. Shell much compressed laterally, flattened upon the periphery; the latter broad, with (in the east) rounded borders. The greatest width of the whorls is in the umbilical region. The umbilicus is very small. The septa are moderately distant, the sutures very strongly bent, first forwards in a narrow lobe on leaving the umbilicus, then backwards in a broader one, then sweeping forward again and making a conspicuous sinus on the periphery. The siphuncle is situated considerably above the centre.

Remarks. Though Oppel, Zittel, and Neumayr unite in regarding *Nautilus strambergensis* as a distinct species from the present one, the resemblance between the two is very striking. The only difference between them is in the form of the sutures, which make a wider (backwardly directed) lobe on the sides of the shell in *N. franconicus* than they do in *N. strambergensis*, and this distinction is expressed in the figures of the latter given by Zittel (*loc. cit.*), which otherwise agree perfectly with specimens of *N. franconicus* with which we have compared them. The name *franconicus* was originally conferred by Oppel* upon a specimen from the Lithographic Slate of Solenhofen.

* "Die Tithonische Etage," Zeitschr. der deutsch. geol. Gesell. Band xvii. p. 546. The "Tithonian" is a special group of the Upper (White) Jura, including the period embraced between the Oxfordian and Portlandian series. See Oppel's 'Die Juraformation Englands, Frankreichs und des südwestlichen Deutschlands,' 1858; also Zittel's "Die Cephalopoden der Stramberger Schichten," Palæont. Mittheil. Band i. Abth. ii., 1868.

The locality of the specimen figured is unknown, but it agrees in all essential points with the German specimens in the Collection, and adds to our knowledge of the species the characters of the body-chamber and of the test. The latter is smooth, being ornamented only with delicate lines of growth. The last two septa are exposed by the removal of the test. A heavy ridge is developed near the base of the body-chamber, its indented outline corresponding roughly with that of the last suture. Part of the anterior boundary of the shell-muscle is seen on the cast of the body-chamber (see fig. 2). The aperture is deeply emarginate.

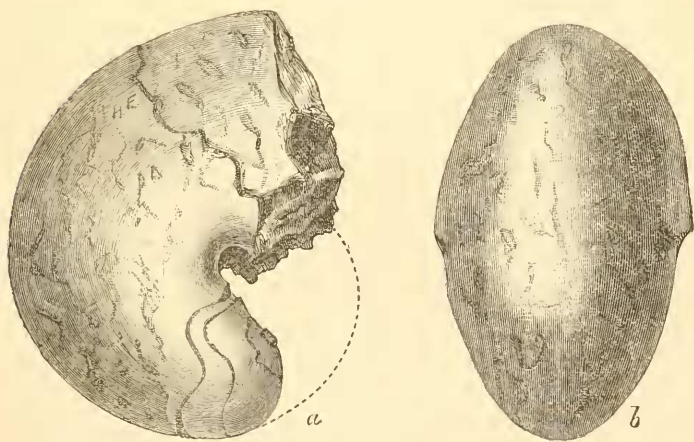
In an excellent figure of this species given by v. Ammon (*loc. cit.*) the anterior border of the shell-muscle is represented upon the cast of the body-chamber.

Horizon. Tithonian.

Localities. Normandy, Escragnoles (Var), France; Randen, near Schaffhausen, Switzerland; Einsingen, Würtemberg.

4. *Nautilus (Hercoglossa) portlandicus*, sp. nov.

Fig. 3.



Nautilus portlandicus.—*a*, lateral view, showing two of the septa and the siphuncle, which projects a little; *b*, peripheral view. Drawn from a specimen in the British Museum (no. 62165). About one sixth natural size.

Sp. char. Shell subglobose, narrowly rounded on the periphery, gently rounded on the sides, widest immediately above the umbilicus; the latter probably closed, or, if open, exceed-

ingly small. Body-chamber forming probably half a volution. Aperture wider than high. Septa approximate, the sutures forming a very distinct sigmoidal curve on the sides of the shell; in passing over the periphery the sutures are slightly bent backwards. The siphuncle is nearly central. The test is not preserved.

Remarks. The large specimen (B.M. no. 62165) upon which the above description is founded is very imperfect, all the inner whorls are wanting, only the two chambers nearest the body-chamber being preserved; nevertheless the species could be easily recognized by the form of the sutures and the narrowly rounded periphery. The dimensions of the fossil are as follows:—Greatest diameter about 13 inches, greatest breadth about $7\frac{1}{2}$ inches.

Horizon. Portland Oolite*.

Locality. Isle of Portland (?), Dorsetshire.

CRETACEOUS.

5. *Nautilus radiatus*, J. Sowerby.

1822. *Nautilus radiatus*, J. Sowerby, Min. Conch. vol. iv. p. 78, pl. cccvi.
1836. *Nautilus radiatus*, Fitton, Trans. Geol. Soc. ser. 2, vol. iv. pt. ii. pp. 204, 367.
1838. *Nautilus radiatus*, d'Archiac, Mém. Soc. Géol. de France, vol. iii. p. 278.
1840. *Nautilus radiatus*, d'Orbigny, Paléontologie Française, Terr. Crét. vol. i. p. 81, pl. xiv.
1845. *Nautilus radiatus*, Ibbetson and Forbes, Quart. Journ. Geol. Soc. vol. i., table facing p. 197.
1845. *Nautilus radiatus*, Forbes, *ibid.* p. 353.
1849. *Nautilus subradiatus*, d'Orbigny, Prodr. de Paléont. Stratigr. vol. i. p. 145.
1852. *Nautilus squamosus*, Giebel, Fauna der Vorwelt, Band iii. Abth. i. p. 141 (not of Schlotheim).
1853. *Nautilus radiatus*, Sharpe, Description of the Fossil Remains of Mollusca found in the Chalk of England, Memoirs of the Palæontographical Society, pt. i., Cephalopoda, p. 14, pl. v. figs. 1 a, 1 b, 2.
1854. *Nautilus radiatus*, Morris, Cat. British Fossils, 2nd ed. p. 307.
1859. *Nautilus Neckerianus*, Pictet and Campiche, Descr. des Fossiles du Terr. Crét. des Environs de Sainte Croix, Paléont. Suisse, sér. ii. pt. i. p. 132, pl. xvi.
1862. *Nautilus radiatus*, Bristow and Etheridge, in Bristow's Geology of the Isle of Wight, Mem. Geol. Surv. of Great Britain, Sheet 10, p. 137.
1881. *Nautilus radiatus?* Etheridge, in H. B. Woodward's Geology of the Country around Norwich, Mem. Geol. Surv. of Great Britain, p. 16.

Sp. char. Shell somewhat compressed upon the sides, rounded upon the periphery; section of the whorls wider

* Portlandien of d'Orbigny.

than high. Umbilicus closed, though open in the east. Septa rather numerous, slightly curved upon the sides, a very obscure sinus upon the periphery. Siphuncle situated below the centre. Ornaments of the test consisting of numerous, very coarse, prominent, obtuse ridges, separated by interspaces of about half their own width. The ridges are each about 3 lines wide upon the periphery, where they form a narrow backwardly-directed sinus.

Remarks. Pictet and Campiche, in the Pal. Suisse *, have adopted the name *Nautilus Neckerianus* for a form which is evidently identical with Sowerby's *N. radiatus*, and the source of error seems to have been in the locality of the type specimen of the last-named species, which is referred to by Sowerby † in the following words:—"Lately found in the neighbourhood of Malton, probably in the lower part of the Green Sand formation. I have received but one specimen, a cast in Marly Limestone, mixed with grains of Silix and of blackish Green-earth." Possibly the locality quoted by Pictet and Campiche was taken from the supplementary index to the 'Mineral Conchology' by Mr. John Farey, who gives "New-Malton, E.," as the locality of the type.

We have been able to identify Sowerby's type in the "Sowerby Collection," and the matrix agrees with that described by Sowerby, showing that the specimen came from the Lower Greensand. In its mode of preservation and general appearance as to colour, texture, &c., it closely resembles specimens from the Lower Greensand of Hythe. Without doubt Sowerby's specimen was derived from the Lower Greensand, but we have not been able to obtain any clue as to the locality (Malton), furnished by him in his description, above quoted.

There seems to be no ground whatever for Young and Bird's statement on p. 271 of their work on the Yorkshire Coast (2nd ed.), that "Sowerby's *N. radiatus* (tab. 256) was found near Malton, most probably in the grey limestone under the Oolite." Those authors were probably misled by the locality given by Farey in the Supplementary Index to vol. iv. of the 'Mineral Conchology.'

Nautilus bifurcatus, Ooster ‡, somewhat resembles the present species, but differs in its more compressed form, and in the possession of fine and numerous longitudinal ridges.

* Sér. ii. pt. i. 1859, p. 132, pl. xvi.

† Min. Conch. vol. iv. 1822, p. 78, pl. cccvi.

‡ Cat. des Céphalopodes Fossiles des Alpes Suisses, pt. iii. 1858, p. 10, tab. ix. fig. 6, tab. x. figs. 1, 2.

Horizon. Lower Greensand.

Localities. Atherfield, Isle of Wight; Hythe, Sandgate, Kent.

6. *Nautilus neocomiensis*, d'Orbigny.

1768. *Un Nautilite*, &c., Knorr and Walch, Monumens des Catastrophes de la Terre, vol. ii. section i. p. 45, tab. i. fig. 2.
1813. *Nautilus squamosus*, Schlothheim, Taschenb. f. Mineralogie, vol. vii. p. 71.
1840. *Nautilus neocomiensis*, d'Orbigny, Paléontologie Française, (Terr. Crét.), vol. i. p. 74, pl. xi.
1841. *Nautilus neocomiensis*, Duval-Jouve, Belemn. Terr. Crét. p. 10.
1842. *Nautilus neocomiensis*, Matheron, Catalogue Méthodique et Descriptif des Fossiles du Département des Bouches-du-Rhône, p. 259.
1843. *Nautilus neocomiensis*, Favre, Considérations sur le Mont Salève, p. 34.
1849. *Nautilus squamosus*, Quenstedt, Die Cephalopoden, p. 53.
1850. *Nautilus neocomiensis*, d'Orbigny, Prodrome de Paléontologie Stratigraphique, vol. ii. p. 63.
1850. *Nautilus varusensis*, d'Orbigny, Prodrome de Paléontologie Stratigraphique, vol. ii. p. 97.
1852. *Nautilus neocomiensis*, Gras, Catalogue des Corps Organisés Fossiles du Département de l'Isère, p. 24.
1853. *Nautilus neocomiensis*, de Verneuil & Collomb, Bull. Soc. Géol. de France, sér. ii. vol. x. p. 102.
1854. *Nautilus neocomiensis*, Coquard, Mém. Soc. Géol. de France, sér. ii. vol. v. p. 147.
1854. *Nautilus neocomiensis*, Morris, Cat. British Fossils, 2nd ed. p. 307.
1859. *Nautilus neocomiensis*, Pictet & Campiche, Description des Fossiles des Environs de Sainte Croix (Paléontologie Suisse, sér. ii. pt. i. livr. vii.), p. 128, pl. xv.
1860. *Nautilus varusensis*, Pictet & Campiche, *ibid.* p. 123.
1861. *Nautilus Kayeanus*, Blanford, Mem. Geol. Surv. of India, Palæont. Indica.—I. Cretaceous Cephalopoda of Southern India, p. 31, pl. xvi. figs. 5, 6, pl. xvii. figs. 1, 2, pl. xviii. figs. 1, 2, pl. xxi. fig. 2.
1861. *Nautilus neocomiensis*, Reynés, Études sur le Synchronisme et la Délimitation des Terr.-Crétacés du Sud-Est de la France, p. 33.
1862. *Nautilus neocomiensis*, Bristow and Etheridge, in Bristow's Geology of the Isle of Wight, Mem. Geol. Surv. Great Britain Sheet 10, p. 137.
1866. *Nautilus neocomiensis*, Stoliczka, Mem. Geol. Surv. of India, Palæont. Indica.—I. Cretaceous Cephalopoda of Southern India, p. 210, pl. xvi. figs. 5, 6, pl. xvii. figs. 1, 2, pl. xviii. figs. 1, 2, pl. xxi. fig. 2.
1883. *Nautilus neocomiensis*, Leenhardt, Etude Géologique de la Région du Mont Ventoux, p. 56.
- [Not 1853. *Nautilus neocomiensis*, Sharpe, Description of the Fossil Remains of Mollusca found in the Chalk of England, pt. i. Cephalopoda, p. 15, pl. v. figs. 3, a-c.]

Sp. char. Shell compressed at the sides, with a narrowly rounded periphery. Umbilicus of moderate size, and exhi-

biting the inner volutions. Transverse section of the whorls wider than high. Septa very slightly curved upon the sides, and forming a slight sinus upon the periphery. Siphuncle placed a little below the centre. Ornaments of the test consisting of numerous, prominent, obtuse ridges, separated by interspaces about half their own width. These ridges are about 2 lines wide on the periphery, where they form a deep, narrow, backwardly-directed sinus.

Remarks. This species differs from *N. radiatus* by its more compressed form and the much finer ornaments of the test. Moreover, *N. neocomiensis* is stated by d'Orbigny to have been found only in the middle beds of the Neocomian, while *N. radiatus* was peculiar to the Craie glauconieuse ("Craie chloritée" of d'Orbigny and the older authors), none being found in the intermediate beds.

N. squamosus, Lange (Schlotheim), and *N. varusensis*, d'Orbigny, are placed in the synonymy of the present species on the authority of MM. Pictet and Campiche. Of the former those authors affirm that Quenstedt was quite in error in supposing it to be identical with the *neocomiensis* of d'Orbigny, the *N. squamosus* of Lange being a smooth species from the Jurassic rocks of the neighbourhood of Baden. Of the latter (*N. varusensis*) the same authors remark that the short description given of it by d'Orbigny indicates no appreciable difference between it and *neocomiensis*.

Stoliczka* held that the *Nautilus Kayeanus* of Blanford was identical with *N. neocomiensis*, having arrived at that conclusion by a comparison of actual specimens of the European with the Indian fossils. He finds, it is true, that Pictet's specimens have generally a smaller number of septa (about 15 to a whorl) than the Indian ones, but the latter agree perfectly with d'Orbigny's original figure of *N. neocomiensis*, and, he adds, an equal number of septa, about 20, are to be observed on specimens from Escragnolles, the typical locality of d'Orbigny's species.

Horizon. Neocomian.

Localities. Grasse, Escragnolles (Var), France; Neuchâtel, High Alp (Sentis), Appenzell, Switzerland.

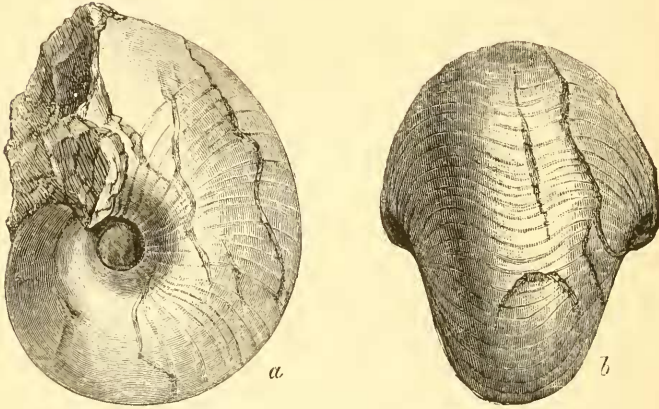
7. *Nautilus hunstantonensis*, sp. nov.

Sp. char. Shell moderately inflated, slightly compressed on the sides, rounded on the periphery, widest part of the whorls in the umbilical region. Umbilicus small, deep, with steeply

* Mem. Geol. Surv. India, Palæont. Indica.—Cretaceous Cephalopoda of Southern India, 1866, p. 210.

sloping sides and rounded edges. Septa rather wide apart, fourteen to a whorl in a specimen whose diameter is 3 inches (fig. 5). Siphuncle a little above the centre in the young

Fig. 4.

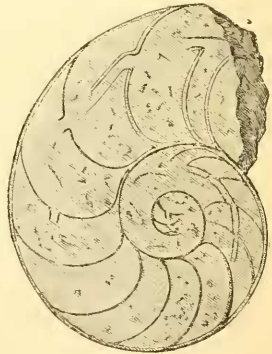


Nautilus hunstantonensis.—*a*, lateral view, showing the open umbilicus; *b*, peripheral view, showing the lines of growth. Drawn from a specimen in the British Museum (no. C. 932), presented by J. E. Lee, Esq., F.G.S. About one half natural size.

shell, but getting much nearer the peripheral margin in the process of growth, as may be seen in the accompanying section (fig. 5), which is drawn (about three fifths nat. size) from a specimen in the British Museum (no. C. 82449). Surface of the test ornamented with obscure and irregular plications, commencing in the umbilicus, where they are most distinct, but becoming less so as they approach the periphery. Fine lines of growth cover the whole of the test.

Remarks. There are two species in the Gault with which the present one may be compared, viz. *Nautilus Bouchardianus*, d'Orbigny, and *N. Montmollini*, Pictet and Campiche. Our species agrees with the former of these in the position of its siphuncle, but differs in its more numerous septa and larger umbilicus, while it is distinguished from the latter chiefly by the posi-

Fig. 5.



tion of its siphuncle, somewhat larger umbilicus, and more inflated whorls.

The gradual shifting of the position of the siphuncle in the present species from a central position in the young to a nearly external position in the adult is a feature met with in other species; Stoliezka has observed it in *Nautilus Huxleyanus*, Blanford, and in *N. sphaericus*, Forbes, and other species*.

Many authors have recorded the occurrence of various species of *Nautilus* in the Red Chalk or Hunstanton Limestone †; but the present form does not appear yet to have been characterized.

Horizon. Red Chalk.

Locality. Hunstanton, Norfolk.

8. *Nautilus triangularis*, Montfort.

1802. *Nautilite triangulaire*, Montfort, in his edition of Sommi's "Suite à Buffon" (Hist. Nat. des Mollusques, An. x.), vol. iv. p. 292, pl. xlix. fig. 2.
1808. *Nautilus triangularis*, Montfort, Couch. Syst. p. 7 (*G. angulithes*).
1820. *Nautilites angulites*, Schlotheim, Die Petrefactenkunde, p. 84.
1832. *Nautilus triangularis*, Passy, Descr. Géol. de la Seine-Inférieure, p. 334.
1834. *Nautilus triangularis*, d'Archiac, Mém. Soc. Géol. de France, vol. ii. pt. ii. p. 191.
1840. *Nautilus triangularis*, d'Orbigny, Paléontologie Française, Terr. Crét., vol. i. p. 79, pl. xii.
1842. *Nautilus triangularis*, Matheron, Cat. Méth. et Descrip. des Fossiles du Départ. des Bouches-du-Rhône et Lieux Circonvoisins, p. 259.
1850. *Nautilus triangularis*, d'Orbigny, Prodrome de Paléontologie Stratigraphique, vol. ii. p. 145.
1852. *Nautilus triangularis*, Giebel, Fauna der Vorwelt, Band iii. Abth. i. p. 162.
1854. *Nautilus triangularis*, Millet, Paléontologie de Maine et Loire, p. 103.

* Mem. Geol. Surv. India, Palæont. Indica, ser. iii. 1866, p. 205.

† The following are some of the principal references:—

- (1) Samuel Woodward, 'An Outline of the Geology of Norfolk,' 1833, p. 54.—*Nautilus elegans*.
- (2) Rev. Thomas Wiltshire, "On the Red Chalk of England," Geol. Assoc. 1859, p. 17, pl. i. fig. 3.—*Nautilus simplex*.
- (3) H. G. Seeley, "Notice of Opinions on the Stratigraphical Position of the Red Limestone of Hunstanton," Ann. & Mag. Nat. Hist. ser. 3, vol. vii. 1861, p. 244.—*Nautilus simplex*.
- (4) Rev. T. Wiltshire, "On the Red Chalk of Hunstanton," Quart. Journ. Geol. Soc. vol. xxv. 1869, p. 185.—*Nautilus albensis*, *N. Bouchardimus*.
- (5) W. Hill, "On the Lower Beds of the Upper Cretaceous Series in Lincolnshire and Yorkshire," Quart. Journ. Geol. Soc. vol. xlv. 1888, p. 347.—*Nautilus*, sp.

1859. *Nautilus triangularis*, Pictet & Campiche, Description des Fossiles du Terrain Crétacé des Environs de Sainte-Croix (Paléontologie Suisse), sér. ii. pt. i. pp. 141, 149.
1861. *Nautilus triangularis*, Reynés, Etudes sur le Synchronisme et la Délimitation des Terr.-Crétacés du Sud-Est de la France, p. 41.
1866. *Nautilus triangularis*, Beltremieux, Faune Fossile du Département de la Charente-Inférieure, pp. 43, 80.

Sp. char. Shell compressed, smooth, with the periphery alternately rounded and sharply angular; umbilicus closed; section triangular, the sides very slightly rounded, deeply emarginated by the preceding whorl. Septa considerably curved upon the sides, and projecting forwards upon the peripheral angle, slightly bent backwards in the umbilicus. According to d'Orbigny the siphuncle is situated below the centre, not far from the ventral border. Test unknown.

Remarks. This species is readily distinguished from *Nautilus Fleuriausianus*, d'Orbigny, as figured and described in the 'Pal. Franç.' (Terr. Crét. vol. i. p. 82, 1840, pl. xv.) by its sharply angular periphery at different stages of growth. D'Orbigny in his 'Prodrome' (vol. ii. 1850, p. 145) makes his *Nautilus Fleuriausianus* a synonym of the present species, but he gives no reason for so doing, and we have no evidence to show that *N. Fleuriausianus* underwent the same changes of form as those noticed in *N. triangularis*. These remarkable changes were pointed out by M. Ed. Guéranger in a paper read before the Geological Society of France (Bull. sér. ii. vol. vii. 1850, p. 803), and he thus described them:—"Un caractère particulier et inédit est d'avoir le dos de la spire alternativement anguleux ou en carène, et parfaitement arrondi;" . . . Stoliczka * considers also that these forms are quite distinct.

Horizon. Lower Chalk (England). Upper Greensand (France).

Localities. Sidmouth, Devonshire; Folkstone, Kent; Escraguolles (Var), France.

9. *Nautilus libanoticus*, sp. nov.

1878. *Anmonites Traskii*, O. Fraas, Aus dem Orient, Theil ii. Geol. Beobachtungen am Libanon, p. 97, Taf. iv. fig. 4 (not of Gabb).

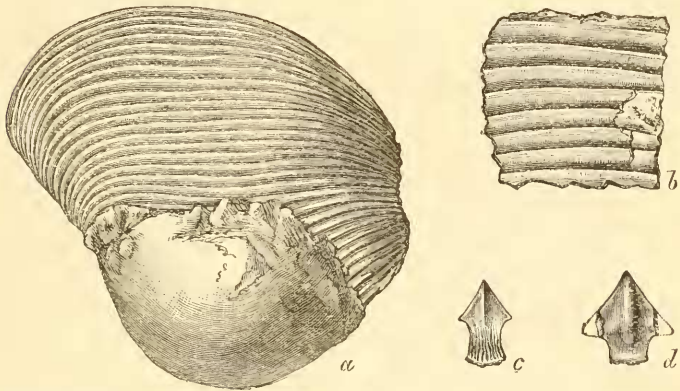
Sp. char. Shell much inflated, rapidly increasing, broadest in the umbilical region. Umbilicus probably closed. Test ornamented with prominent acute ribs, separated by interspaces rather exceeding their own width. Some of the ribs bifurcate in the region of the umbilicus.

Remarks. All the specimens are casts more or less crushed

* Mem. Geol. Surv. India, Palæont. Indica, ser. ii. 1866, p. 207.

and distorted, and nothing is seen in them of the septa or siphuncle; nevertheless the ornaments of the test are sufficient to distinguish the species from others which it may resemble. The general form of *N. libanoticus* suggests that of *N. elegans*, J. Sowerby, but the character of the ornaments in the latter differs from that of the former, the ribs being at once broader and closer together in Sowerby's species than

Fig. 6.



Nautilus libanoticus.—*a*, peripheral view of a distorted specimen (no. C. 542); *b*, portion of the test of another specimen (no. C. 542 *a*); *c*, beak from specimen no. 83663; *d*, beak from no. C. 2918. Drawn from specimens in the British Museum. *a* rather exceeding one half natural size; *b* natural size; *c* and *d* one and a half times natural size.

they are in the present one; and this distinction is maintained even in casts. Fortunately one of our specimens has a portion of the test preserved, and it is here figured (fig. 6, *b*). The beaks are exposed to view on the ventral surface of the body-chambers of several of the specimens (fig. 6, *c*, *d*).

Horizon. Upper Cretaceous.

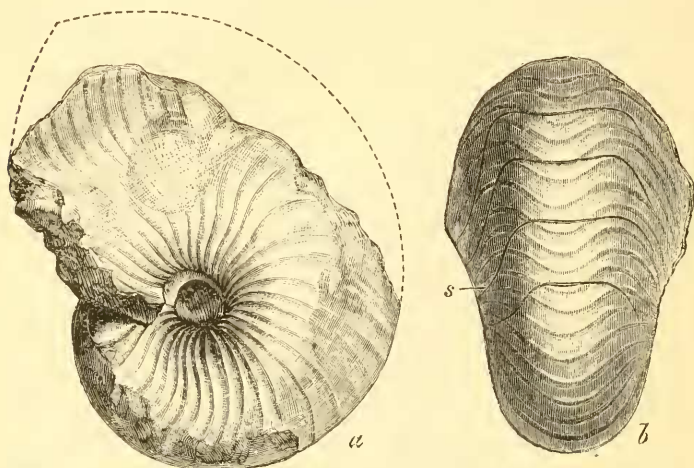
Locality. Sâhil Alma, Lebanon, Syria.

10. *Nautilus Bayfieldi*, sp. nov.

Sp. char. Shell somewhat compressed upon the sides and a little flattened upon the periphery, the thickest part of the whorls being in the umbilical region. The umbilicus is rather small, with steeply sloping sides and rounded borders; the inner whorls partly exposed. The whorls present a subtriangular outline in section, owing to the flattening of the sides and the superior width of the dorsal as compared with

the ventral or peripheral side. The septa are moderately distant, being about 7 lines apart where the height of the whorl is $1\frac{1}{3}$ inch. The sutures are slightly bent backwards

Fig. 7.



Nautilus Bayfieldi.—*a*, lateral view of a specimen, showing the umbilicus and the ribs ornamenting the test; *b*, peripheral view of another specimen, showing sutures (*s*) and ribs. Drawn from specimens in the British Museum (*a*, no. C. 3103; *b*, no. C. 3102), about two thirds natural size.

on the sides of the shell and form a shallow sinus on the periphery. There appears to be an inner lobe. The siphuncle is situated a little below the centre. The test is ornamented with numerous acute transverse ribs or plications, separated from each other by spaces about equal to their own width. The ribs form a deep sinus in crossing the periphery.

Remarks. This species is closely allied to *Nautilus patens*, Kner*, from which, however, it differs in its more compressed whorls, smaller umbilicus, and the position of its siphuncle, which is below instead of being above the centre. The present species bears some resemblance to *Nautilus Deslongchampsianus*, d'Orb.†; but the latter has a more inflated shell, a distinctly angular umbilical border, and longitudinal as well as transverse ornaments.

* 'Versteinerungen des Kreidemergels von Lemberg und seiner Umgebung,' p. 7, tab. i. figs. 2, 2*a*. See also Dr. Clemens Schlüter, "Cephalopoden der oberen Deutschen Kreide," in *Palæontographica*. Band xxiv. Lief. 1, April 1876, p. 178, Taf. 1.

† *Paléont. Française (Terr. Crét.)*, vol. i. p. 90, pl. xx.

We have pleasure in associating with this species the name of Mr. T. G. Bayfield, of Norwich, from whose fine collection of Upper-Chalk fossils all the examples of this species, now in the British Museum, were derived.

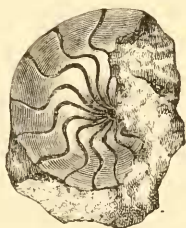
Horizon. Upper Chalk.

Locality. Norwich.

11. *Nautilus (Hercoglossa) danicus*, Schlotheim, sp.

1820. *Nautilus danicus*, Schlotheim, Die Petrefactenkunde, p. 83.
1834. *Nautilus danicus*, v. Buch, Neues Jahrbuch für Mineralogie, &c. p. 533.
1835. *Nautilus danicus*, Beck, Proceed. Geol. Soc. vol. ii. p. 218.
1837. *Nautilus danicus*, Lyell, Trans. Geol. Soc. vol. v. pt. i. p. 250, pl. xviii. figs. 4-7.
1837. *Nautilus danicus*, von Buch, Ueber den Jura in Deutschland (Akad. der Wissensch.), p. 119.
1850. *Nautilus danicus*, Geinitz, Das Quadersandsteingebirge oder Kreidegebirge in Deutschland, p. 110.
1850. *Nautilus danicus*, d'Orbigny, Prodr. de Paléont. Stratigr. vol. ii. p. 290.
1851. *Nautilus danicus*, d'Orbigny, Neues Jahrbuch für Mineralogie, p. 101.
1852. *Nautilus danicus*, Giebel, Fauna der Vorwelt, Band. iii. Abth. i. p. 138.
1861. *Nautilus danicus*, Binkhorst, Mon. des Gastéropodes et des Céphalopodes de la Craie Supérieur du Limbourg, pt. ii. p. 16.
1865. *Nautilus danicus*, Blanford, Mem. Geol. Surv. India, Palæont. Indica, Foss. Ceph. Cretaceous Rocks of S. India, p. 24, pl. x. figs. 4, 4 a, pl. xi.
1865. *Nautilus danicus*, Stoliczka, *ibid.* p. 203.
1868. *Nautilus danicus*, Dewalque, Prodrome d'une Description Géologique de la Belgique, p. 358.
1868. *Nautilus danicus*, Stoliczka, Records Geol. Surv. India, no. 2, p. 32.

Fig. 8.



Nautilus (Hercoglossa) danicus.—Lateral view of a young example, showing the curvature of the sutures. Drawn from a specimen in the British Museum (no. C.3106). Natural size.

Sp. char. Shell subinflated, flattened on the sides, narrowly rounded on the periphery; umbilicus closed. Septa moderately distant, being 5 lines apart on the periphery, where

the height of the whorl is 11 lines. Sutures forming an acute, forwardly-directed lobe near the umbilicus, then bending backwards into a somewhat broader lobe, and again directed forwards towards the periphery, in crossing which they make a broad arch. There is a very distinct internal (dorsal) lobe in young specimens. The siphuncle is a little below the centre. The body-chamber and test are unknown.

Remarks. This species is distinguished from *Nautilus franconicus* by the form of its shell, which has a rounded instead of a truncated periphery; its siphuncle also is differently placed. There is no species in the Chalk of Europe with which it may be compared. *N. danicus* has been recognized by H. F. Blanford* in the upper part of the Arrialoor Group (Cretaceous) of Southern India. Mr. Blanford found that the only difference between the Indian specimens and the figures of *N. danicus* given by Lyell in the Trans. Geol. Soc. (*loc. cit.*) was "a somewhat greater compression of form" in some of the former; this he found, however, to be a variable character in the Indian specimens. He remarks that the very large size to which the Trichinopoly specimens occasionally attain can scarcely be regarded as a specific character. The internal lobe is present in young examples of the Indian specimens, disappearing in older ones. In the volume already quoted † Stoliczka has the following remarks on the present species:—"So far as the existing figures of *N. danicus* [Trans. Geol. Soc., *loc. cit.*] allow an opinion to be formed, the Indian fossil does not vary from the European, except in the usually greater thickness of the whorls." The following species from the Cretaceous rocks of Southern India form a group of which *N. danicus* is the European representative, viz. *N. serpentinus*, Blanford ‡, *N. Forbesianus*, Blanford §, *N. trichinopolitensis*, Blanford ||.

Horizon. Upper Chalk.

Locality. Faxoe, Denmark.

TERTIARY.

12. *Nautilus (Hercoglossa) Cassinianus*, sp. nov.

[*Aturia Cassiniana*, Edwards, MS.]

Sp. char. Shell compressed, with flattened sides and narrowly rounded periphery. Greatest thickness in the region

* Mem. Geol. Surv. India, Palæont. Indica, 1861, series i. Cret. Ceph. of Southern India, p. 24.

† Mem. Geol. Surv. India, Palæont. Indica, 1866, series iii. Cret. Ceph. of Southern India, p. 208.

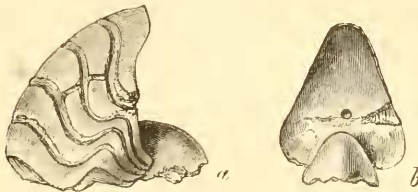
‡ Mem. Geol. Surv. India, Palæont. Indica, ser. i. 1861, p. 25, pl. xii. figs. 1, 1a; *ibid.* ser. iii. 1866, p. 208, pl. xcii. fig. 2.

§ *Ibid.* p. 26, pl. xiii.

|| *Ibid.* p. 37, pl. xxiii., pl. xxiv. figs. 1, 2; *ibid.* ser. iii. 1866, p. 212.

of the umbilicus; the latter closed. Septa approximate, sutures forming a sharply-bent, forwardly-directed lobe after

Fig. 9.



Nautilus (Hercoglossa) Cassinianus.—*a*, lateral view of a fragment, showing the curvature of the sutures; *b*, front view, showing the position of the siphuncle. Drawn from a specimen in the British Museum (no. 71003). Natural size.

leaving the umbilicus, then bent backwards in a similar lobe, and finally directed forwards towards the periphery, which they cross with a narrow arch. Siphuncle situated below the centre.

Remarks. This species closely resembles *Nautilus (Hercoglossa) danicus*, but is easily distinguished by its more compressed whorls and the position of its siphuncle. It may be added that the close proximity of these species in the geological series (*N. (H.) danicus* from the uppermost beds of the Chalk, and *N. (H.) Cassinianus* from the Lower Eocene) renders their near relationship highly probable.

The name of this species is taken from a list of the Edwards Collection of Fossils now in the British Museum, but the species was never described. Edwards erroneously placed it in the genus *Aturia*.

Horizon. London Clay (Lower Eocene).

Localities. Finchley, Middlesex (Edwards's type); Isle of Sheppey.

L.—*Further Descriptions of new Coleoptera of the Family Scarabæidæ in the British Museum.* By CHARLES O. WATERHOUSE.

SINCE my last paper was written (*suprà*, p. 365) I have, by the kindness of Mr. D. Sharp, been able to examine the type specimens of the species of *Gymnopleurus* described by him. I think that in this genus, as in so many other Coprophaga, there are two forms of males, a major and a minor form, the major form having the anterior tibiæ more inflexed at the apex and the posterior angles of the thorax